UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,268	01/23/2004	Quing Zhu	UCT-0041	6179

23413   7590   11/14/2007

CANTOR COLBURN, LLP
55 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

EXAMINER
CWERN, JONATHAN

ART UNIT	PAPER NUMBER
3737	

MAIL DATE	DELIVERY MODE
11/14/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

Office Action Summary	Application No. 10/764,268	Applicant(s) ZHU, QUING
	Examiner Jonathan G. Cwern	Art Unit 3737

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _10 September 2007_.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-17_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-17_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments filed 9/10/07 have been fully considered but they are not

persuasive.

2.   In regards to applicant's arguments that Bick does not teach the claimed

"segmentation", examiner respectfully disagrees. The purpose of Bick's invention, as

taken from the abstract is, "a method and system for the automated detection of lesions

in medical images". The language of claim 1 reads, "segmenting the scanned volume

into a lesion region including the lesion and a background region absent the lesion

using the ultrasound images". Bick does teach segmenting the breast from other tissue,

however the breast can be considered the lesion region. The lesions are in the breast,

and the surrounding tissue (not the breast) does not contain the lesions. Therefore Bick

does teach segmenting the scanned volume into a "lesion region" (the breast tissue

containing lesions) and a background region absent the lesion (tissue surrounding the

breast). Bick performs segmentation with the goal of identifying lesions.

3.   In regards to applicant's arguments that Bick does not teach reconstructing from

the optical measurements an optical image of at least a portion of the scanned volume,

the reconstructing being performed using different voxel sizes for optical measurements

corresponding to the lesion region and optical measurements corresponding to the

background region, examiner agrees. However, examiner stated in the Non-Final

rejection that Zhu showed these limitations of the claim, not Bick. Zhu shows in column

6, lines 15-35, that the optical measurements can be made and used in well-known

image reconstruction schemes. Zhu goes on to describe reconstructing the voxels and

the voxel sizes, for the particular application. Zhu does not however teach

segmentation, and so does not describe using different voxel sizes for different

segmented regions. However, the image reconstruction schemes are well known in the

art. It is well known that the voxel size can be selected, which Zhu also shows

(reconstructed voxels measure 1cm by 1cm by 1cm). One of ordinary skill in the art

would have known to choose any voxel size for their particular application. In the case

of segmentation, the purpose is to highlight regions of the breast where there is

damaged tissue for the physician to examine more closely. It would be obvious to

further highlight these damaged regions by changing their size from the rest of the

tissue. Enlarging certain areas of an image and/or modifying voxel sizes are well known

image reconstruction schemes.

4.   There is a reasonable expectation of success to combine these references

because both are related to detecting lesions in the breast. Bick teaches image

processing techniques which do not depend on the imaging modality, and could be

applied to any image, including those acquired by the device of Zhu.

5.   Therefore, examiner withholds previous rejection dated 9/10/07 and repeated

below.

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2.   The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

3.   Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu

(US 6264610, patented: 7/24/01) in view of Bick et al. (US 6185320, patented: 2/6/01).

4.   Zhu shows, with respect to claims 1, 10, and 11, a method for imaging a lesion

using combined near infrared diffusive light and ultrasound (abstract), the method

comprising: scanning a subject with ultrasound waves to obtain ultrasound images of a

scanned volume (column 2, lines 1-16), the scanned volume including the lesion;

scanning the subject with near infrared light to obtain optical measurements of the

scanned volume (column 2, lines 1-16); and reconstructing from the optical

measurements an optical image of at least a portion of the scanned volume, the

reconstructing being performed using different voxel sizes for optical measurements

corresponding to the lesion region and optical measurements corresponding to the

background region (the optical measurements are used in well-known image

reconstruction schemes, column 6, lines 17-21); with respect to claims 2 and 10,

measuring parameters of the lesion using the ultrasound images to provide values

indicative of the parameters; and reconstructing the optical image again using the

values (target structure information is used for optical reconstruction algorithms, column

7, lines 8-13); with respect to claims 3 and 12, the optical measurements include

amplitude and phase (column 6, lines 12-17); with respect to claims 4 and 13,

determining absorption and scattering coefficients at slice depths in the scanned volume

(column 6, lines 18-20); with respect to claims 5 and 14, the optical image indicates at

least one of wavelength-dependent absorption associated with the lesion and

hemoglobin concentration associated with the lesion (oxygenation and blood volume

are detected, column 7, lines 4-7); and with respect to claim 9, wherein the

reconstructing the optical image again further includes: controlling the total number of

voxel sizes (the number of unknowns and the number of measured parameters are kept

approximately the same, column 6, lines 30-34).

Zhu fails to show, with respect to claims 1 and 10, segmenting the scanned

volume into a lesion region including the lesion and a background region absent the

lesion using the ultrasound images; with respect to claims 6 and 15, the values indicate

lesion location in the scanned volume and size of the lesion; with respect to claims 7

and 16, increasing a value indicating lesion size to account for possible inaccuracies of

an initial lesion size estimate; and with respect to claims 8 and 17, the value indicating

lesion size is a value indicating a diameter of the lesion.

Bick teaches, with respect to claims 1 and 10, segmenting the scanned volume

into a lesion region including the lesion and a background region absent the lesion

using the ultrasound images (abstract); with respect to claims 6 and 15, the values

indicate lesion location in the scanned volume (x-y position of the lesion represents the

location, column 8, line 41) and size of the lesion (size, column 8, line 33); with respect to claims 7 and 16, increasing a value indicating lesion size (the size of the template can be varied, column 7, line 67 through column 8, line 1) to account for possible inaccuracies of an initial lesion size estimate (a larger template is used to make sure that the entire lesion is covered and it is then minimized to find the optimal size, column 8, lines 38-45); and with respect to claims 8 and 17, the value indicating lesion size is a value indicating a diameter of the lesion (diameter, column 8, line 33).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have combined the image segmentation technique as taught by Bick, in the device of Zhu, with the motivation that segmenting an image will eliminate unnecessary components of the image (such as healthy tissue), so that the important components of the image can be focused on (such as a lesion), increasing the chance of detecting cancer in the patient. There is a reasonable expectation of success to combine these references because both are related to imaging to detect breast lesions.

Conclusion

5.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan G. Cwern whose telephone number is 571-270-1560. The examiner can normally be reached on Monday through Friday 9:30AM - 6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JC
11/1/07